

Response is timely filed. Allowance of all claims is respectfully requested in view of the Amendments and Remarks below.

Amendments

Please amend the above-identified application, as follows:

In the Claims:

✓ Kindly amend claims 1-3, 6, 9-13, 17-19, 21, 22, 24, 27 & 29 as set forth below. All the claims are reproduced below for the Examiner's convenience.

SUB BT
A

1. (Amended) In a method of encoding a digital video image stream in an encoder, comprising spatial compression of still images in the digital video image stream and temporal compression between the still images, wherein the spatial compression is carried out by converting a time domain image of a macroblock to a frequency domain image of the macroblock, taking a discrete cosine transform of the frequency domain image, transforming the discrete cosine transformed macroblock image by a quantization factor, and run length encoding the quantized discrete cosine transformed macroblock image, wherein the temporal compression is carried out by reconstructing the quantized, discrete cosine transformed image of the macroblock, searching for a best match macroblock, and constructing a

1
A cont.

motion vector therebetween, to thereby form a bitstream comprising run length encoded, quantized, discrete cosine transformed macroblocks and motion vectors, and passing the bitstream to and through an external buffer to a transmission medium, the improvement comprising feeding back to the encoder an external buffer read signal from a host and incrementing an on-chip counter each time that the external buffer is read and calculating therefrom the number of bits read by a host (R), and determining the number of bits encoded and written into an external buffer (E), and in the encoder subtracting from a number of bits encoded (E) the number of bits read by the host (R) to give the fullness of an external buffer (BF), and providing from the encoder to the host a dynamic buffer level indicator in real time indicative of the fullness of the external buffer (BF).

2. (Amended) The method of claim 1, wherein said providing the host with said dynamic buffer level indicator comprises comparing the fullness of the external buffer (BF) with a buffer threshold (BT) defined by said host and providing a high-level indicator when a buffer fullness (BF) is greater than the buffer threshold (BT), and a low-level indicator when the buffer threshold (BT) is greater than the buffer fullness (BF).

3. (Amended) The method of claim 2, further comprising retaining said buffer threshold (BT) in a register within the encoder for use in comparing of buffer fullness (BF) to the buffer threshold (BT).

4. The method of claim 1, further comprising providing an external buffer configuration register in said encoder for retaining multiple external buffer configuration values, and wherein said calculating in the encoder the number of bits read by the host (R) includes employing a predefined configuration value of the external buffer configuration register in determining the number of bits read by the host (R) upon receipt of each buffer read signal from the host.

5. The method of claim 4, wherein said multiple external buffer configuration values retained in said external buffer configuration register comprise at least some of 1, 2, 4 and 8 byte buffer configuration values, each value being representative of a number of bytes read from said external buffer with each buffer read signal from the host for a respective external buffer configuration.

12 6. (Amended) The method of claim 1, wherein said external buffer comprises a FIFO buffer.

7. The method of claim 1, wherein said external buffer comprises one of a field buffer or cascaded FIFO buffers, and wherein said dynamic buffer level indicator comprises at least one of a BUFFER_EMPTY flag, BUFFER_ALMOST_FULL flag and BUFFER_FULL flag.

8. The method of claim 1, wherein said providing the host in real time with said dynamic buffer level indicator comprises providing the host in real time with multiple dynamically updated flags, said multiple dynamically updated flags comprising a BUFFER_EMPTY flag, BUFFER_ALMOST_FULL flag and BUFFER_FULL flag.

SUB B2
9. (Amended) In a method of encoding a digital video image stream in an encoder, comprising spatial compression of still images in the digital video image stream and temporal compression between the still images, wherein the spatial compression is carried out by converting a time domain image of a macroblock to a frequency domain image of the macroblock, taking a discrete cosine transform of the frequency domain image, transforming the discrete cosine transformed macroblock image by a quantization factor, and run length encoding the quantized discrete cosine transformed macroblock image, wherein the temporal compression is carried out by reconstructing the quantized, discrete cosine transformed image of the macroblock, searching for a best match macroblock, and constructing a motion vector therebetween, to thereby form a bitstream comprising run length encoded, quantized, discrete cosine transformed macroblocks and motion vectors, and passing the bitstream to and through an external buffer to a transmission medium, the improvement comprising feeding back to the encoder an external read signal from a host and incrementing an on-chip counter each time that the external buffer is read and calculating therefrom the number of bits read by a host (R), and determining the number of bits

encoded and written into an external buffer (E), and in the encoder subtracting from a number of bits encoded (E) the number of bits read by the host (R) to give the fullness of an external buffer (BF), and providing from the encoder to the host in real time a dynamically updated flag comprising at least one of a BUFFER_EMPTY flag, a BUFFER_ALMOST_FULL flag and a BUFFER_FULL flag.

10. (Amended) The method of claim 9, wherein said providing the host in real time with said dynamically updated flag comprises providing the host in real time with at least said BUFFER_EMPTY flag, said providing of said BUFFER_EMPTY flag comprising continuously determining whether said fullness of the external buffer (BF) is equal to 0, and providing a high-level indicator when a buffer fullness (BF) is 0, and a low-level indicator when the buffer fullness is greater than 0.

11. (Amended) The method of claim 9, wherein said providing the host in real time with said dynamically updated flag comprises providing the host with at least said BUFFER_ALMOST_FULL flag, said providing of said BUFFER_ALMOST_FULL flag comprising continuously determining whether the fullness of the external buffer (BF) is greater than or equal to a buffer threshold (BT), and providing said host with a high-level indicator when a buffer fullness (BF) is greater than or equal to said buffer threshold (BT), and a low-level indicator when the buffer threshold (BT) is greater than the buffer fullness (BF).

12. (Amended) The method of claim 11, further comprising providing an on-chip buffer threshold register, said on-chip buffer threshold register containing a host defined buffer threshold value for use in comparing of said buffer fullness (BF) to said buffer threshold (BT).

B.1. Amend.
13. (Amended) The method of claim 9, wherein said providing the host in real time with said dynamically updated flag comprises providing the host in real time with at least said BUFFER_FULL flag, said providing of said BUFFER_FULL flag, comprising continuously comparing the fullness of the external buffer (BF) to a predefined buffer size (BS), and providing the host with a high-level indicator when a buffer fullness (BF) is greater than or equal to said buffer size (BS), and a low-level indicator when said buffer size (BS) is greater than said buffer fullness (BF).

14. The method of claim 13, further comprising providing an on-chip buffer size register for holding a host-defined buffer size value for use in said comparing of said buffer fullness (BF) to said buffer size (BS).

15. The method of claim 9, wherein said external buffer comprises one of an external field buffer or external cascaded FIFOs.

SUB B3

16. (Amended) An encoder for encoding a digital video image stream in the encoder, comprising means for spatial compression of still images in the digital video image stream and means for temporal compression between the still images, wherein the means for spatial compression comprises means for converting a time domain image of a macroblock to a frequency domain image of the macroblock, means for taking a discrete cosine transform of the frequency domain image, means for transforming the discrete cosine transformed macroblock image by a quantization factor, and means for run length encoding the quantized discrete cosine transformed macroblock image, wherein the means for temporal compression comprises means for reconstructing the quantized, discrete cosine transformed image of the macroblock, means for searching for a best match macroblock, and means for constructing a motion vector therebetween, said encoder for encoding a digital video image stream thereby forming a bitstream comprising run length encoded, quantized, discrete cosine transform macroblocks and motion vectors and passing the bitstream to and through an external buffer to a transmission medium, the improvement comprising means for feeding back to the encoder an external read signal from a host, and logic in the encoder for incrementing an on-chip counter each time that the external buffer is read and calculating therefrom the number of bits read by a host (R), said logic in the encoder being further adapted to monitor a number of bits encoded (E) and written into the external buffer and subtract from the number of bits encoded (E) the number of bits read by the host (R) to obtain the fullness of an external buffer (BF), and wherein said logic in the

AM

encoder is further adapted to provide the host with a dynamic buffer level indicator in real time indicative of the fullness of the external buffer (BF).

17. (Amended) The encoder of claim 16, wherein said logic adapted to provide the host with a dynamic buffer level indicator comprises logic adapted to compare the fullness of the external buffer (BF) with a buffer threshold (BT) defined by said host and to provide a high-level indicator when a buffer fullness (BF) is greater than the buffer threshold (BT), and a low-level indicator when the buffer threshold (BT) is greater than the buffer fullness (BF).

18. (Amended) The encoder of claim 17, further comprising a buffer threshold (BT) register within the encoder coupled to said logic adapted to compare said buffer fullness (BF) to the buffer threshold (BT).

19. (Amended) The encoder of claim 16, wherein said external buffer comprises at least one FIFO buffer.

20. The encoder of claim 16, wherein said external buffer comprises one of a field buffer or cascaded FIFO buffers, and wherein said dynamic buffer level indicator comprises at least one of a BUFFER_EMPTY flag, BUFFER_ALMOST_FULL flag and BUFFER_FULL flag.

21. (Amended) The encoder of claim 20, wherein said dynamic buffer level indicator comprises said BUFFER_EMPTY flag, and wherein said logic is further adapted to continuously determine whether said fullness of the external buffer (BF) is equal to 0, and provide a high-level indicator when a buffer fullness (BF) is 0, and a low-level indicator when the buffer fullness is greater than 0.

22. (Amended) The encoder of claim 20, wherein said dynamic buffer level indicator comprises said BUFFER_ALMOST_FULL flag, and wherein said logic is further adapted to continuously determine whether the fullness of the external buffer (BF) is greater than or equal to a buffer threshold (BT), and to provide said host with a high-level indicator when a buffer fullness (BF) is greater than or equal to said buffer threshold (BT), and a low-level indicator when the buffer threshold (BT) is greater than the buffer fullness (BF).

23. The encoder of claim 22, further comprising an on-chip buffer threshold register, said on-chip buffer threshold register containing a host defined buffer threshold value for use by said logic in comparing said buffer fullness (BF) to said buffer threshold.

24. (Amended) The encoder of claim 20, wherein said dynamic buffer level indicator comprises said BUFFER_FULL flag, and wherein said logic is adapted to continuously compare the fullness of the external buffer (BF) to a predefined buffer size (BS), and to provide the host with a high-level indicator when a buffer fullness (BF) is greater than or equal to said buffer size (BS), and a low-level indicator when said buffer size (BS) is greater than said buffer fullness (BF).

25. The encoder of claim 24, further comprising an on-chip buffer size register within said encoder for holding a host-defined buffer size value for use by said encoder logic in comparing said buffer fullness (BF) to said buffer size (BS).

26. The encoder of claim 20, wherein said external buffer comprises one of an external field buffer or external cascaded FIFOs.

27. (Amended) An encoder for encoding a digital video image stream in the encoder, comprising means for spatial compression of still images in the digital video image stream and means for temporal compression between the still images, wherein the means for spatial compression comprises means for converting a time domain image of a macroblock to a frequency domain image of the macroblock, means for taking a discrete cosine transform of the frequency domain image, means for transforming the discrete cosine transformed macroblock image by a quantization factor, and means for run

length encoding the quantized discrete cosine transformed macroblock image, wherein the means for temporal compression comprises means for reconstructing the quantized, discrete cosine transformed image of the macroblock, means for searching for a best match macroblock, and means for constructing a motion vector therebetween, said means for encoding a digital video image stream thereby forming a bitstream comprising run length encoded, quantized, discrete cosine transform macroblocks and motion vectors and passing the bitstream to and through an external buffer to a transmission medium, the improvement comprising means for feeding back to the encoder an external read signal from a host, and on-chip logic in the encoder for incrementing an on-chip counter each time the external buffer is read and calculating therefrom the number of bits read by a host (R), said logic in the encoder being further adapted to monitor a number of bits encoded (E) and written into the external buffer and subtract from the number of bits encoded (E) the number of bits read by the host (R) to obtain the fullness of an external buffer (BF), and wherein said logic in the encoder is further adapted to provide the host in real time with dynamically updated flags comprising a BUFFER_EMPTY flag, a BUFFER_ALMOST_FULL flag and a BUFFER_FULL flag.

28. The encoder of claim 27, wherein said external buffer comprises one of an external field buffer or external cascaded FIFOs.

29. (Amended) The encoder of claim 28, wherein said logic adapted to provide said BUFFER_EMPTY flag comprises logic adapted to continuously determine whether said fullness of the external buffer (BF) is equal to 0, and to provide a high-level indicator when a buffer fullness (BF) is 0, and a low-level indicator when the buffer fullness is greater than 0.

30. The encoder of claim 29, wherein said logic adapted to provide said BUFFER_ALMOST_FULL flag comprises logic adapted to continuously determine whether the fullness of the external buffer (BF) is greater than or equal to a buffer threshold (BT), and to provide said host with a high-level indicator when the buffer fullness (BF) is greater than or equal to said buffer threshold (BT), and a low-level indicator when the buffer threshold (BT) is greater than the buffer fullness (BF).

31. The encoder of claim 30, wherein said logic adapted to provide said BUFFER_FULL flag comprises logic adapted to continuously compare the fullness of the external buffer (BF) to a predefined buffer size (BS), and to provide the host with a high-level indicator when the buffer fullness (BF) is greater than or equal to said buffer size (BS), and a low-level indicator when said buffer size (BS) is greater than said buffer fullness (BF).